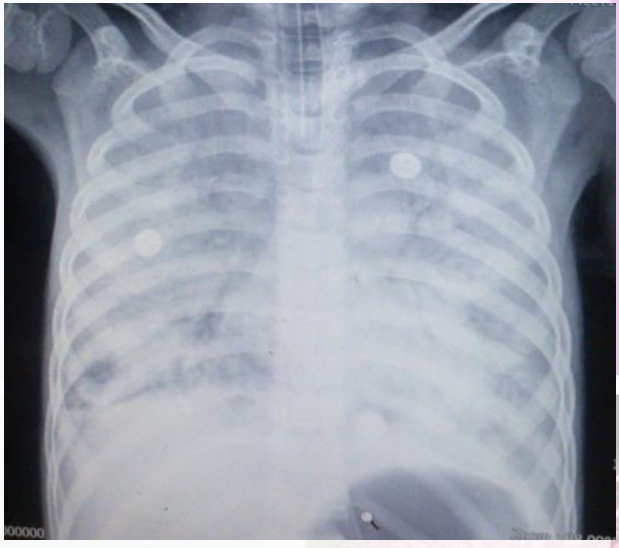
Chickenpox complications and prevention



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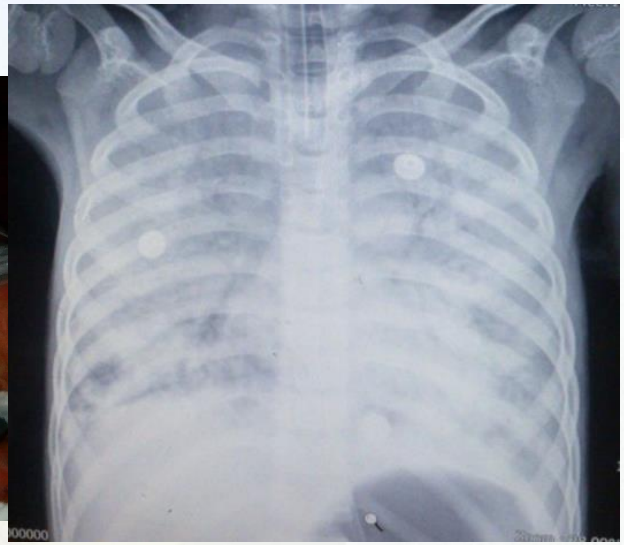
- Varicella-zoster virus (VZV) causes primary, latent, and reactivation infections.
- The primary infection manifests as varicella (chickenpox) and results in establishment of a lifelong latent infection of sensory ganglionic neurons.
- Reactivation of the latent infection causes herpes zoster (shingles).

- Although often a mild illness of childhood, morbidity and mortality are higher in immunocompetent infants, adolescents, and adults, as well as in immunocompromised persons.
- Varicella predisposes to severe group A streptococcus and staphylococcus infections.
- Primary clinical disease can be prevented by immunization with live-attenuated varicella vaccine.
- Varicella can be treated with antiviral drugs.

CLINICAL MANIFESTATIONS

- Varicella has variable severity but is usually self-limited.
- It may be associated with severe complications, including bacterial superinfection, especially with staphylococci and group A streptococci, pneumonia, encephalitis, bleeding disorders, congenital infection, and life-threatening perinatal infection.

- In the immunocompromised child, it results in continued viral replication that may lead to prolonged and/or disseminated infection with resultant complications of infection in the lungs, liver, brain, and other organs.



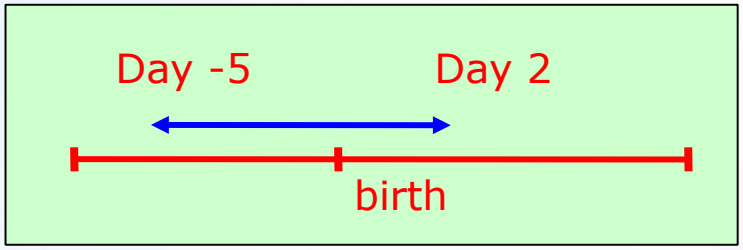
- Ulcerative lesions involving the mucosa of the oropharynx and vagina are also common;
- Many children have vesicular lesions on the eyelids and conjunctivae, but corneal involvement and serious ocular disease are rare.

- The average number of varicella lesions is about 300, but healthy children may have fewer than 10 to more than 1,500 lesions.
- In cases resulting from secondary household spread and in older children, more lesions usually occur,
- The exanthem may be much more extensive in children with skin disorders, such as eczema or recent sunburn.

- Hypopigmentation or hyperpigmentation of lesion sites persists for days to weeks in some children, but severe scarring is unusual unless the lesions were secondarily infected.

Neonatal varicella

Mortality is particularly high in neonates born to susceptible mothers who contract varicella around the time of delivery.



- The infant's rash usually occurs toward the end of the first week to the early part of the second week of life.

They should receive VZIG as soon as possible after birth

. Because perinatally acquired varicella may be life threatening, the infant should usually be treated with acyclovir (10-15 mg/kg every 8 hours IV) when lesions develop.

- Neonates with community-acquired varicella who experience severe varicella, especially those who have a complication such as pneumonia, hepatitis, or encephalitis, should also receive treatment with intravenous acyclovir (10 mg/kg every 8 hours).

Congenital Varicella Syndrome

- In utero transmission of VZV can occur when pregnant women do contract varicella early in pregnancy, as many as 25% of the fetuses may become infected.
- Congenital varicella syndrome occurs in approximately 0.4% of infants born to women who have varicella during pregnancy before 13 weeks of gestation and in approximately 2% of infants born to women with varicella between 13 and 20 weeks of gestation.
- Before of varicella vaccine in the United States, 44 cases of congenital varicella syndrome were estimated to occur each year.

- The congenital varicella syndrome is characterized by cicatricial skin scarring in a zoster-like distribution; limb hypoplasia; and abnormalities of the neurologic system (e.g., microcephaly, cortical atrophy, seizures, and intellectual disability), eye (e.g., chorioretinitis, microphthalmia, and cataracts), renal system (e.g., hydroureter and hydronephrosis), and autonomic nervous system (e.g., neurogenic bladder, swallowing dysfunction, and aspiration pneumonia).
- Congenital syndrome acquired as a result of maternal herpes zoster is exceedingly rare.

COMPLICATIONS

- *The complications of VZV infection (varicella or zoster) occur more commonly in immunocompromised patients.*
- In the otherwise healthy child, asymptomatic transient varicella hepatitis is relatively common.
- Mild thrombocytopenia occurs in 1–2% of children with varicella and may be associated with petechiae.
- Purpura, hemorrhagic vesicles, hematuria, and gastrointestinal bleeding are rare complications that may have serious consequences.
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- Other complications of varicella, some of them rare, include acute cerebellar ataxia, encephalitis, pneumonia, nephritis, nephrotic syndrome, hemolytic-uremic syndrome, arthritis, myocarditis, pericarditis, pancreatitis, orchitis, and acute retinal necrosis.

- Approximately 105 deaths (with varicella listed as the underlying cause of death) occurred in the United States annually before the introduction of the varicella vaccine;
- During 2017– 2019 the annual average number of varicella deaths was 18.
- In both the pre-and post vaccine eras, the majority of deaths (>80%) have been among persons without high-risk preexisting conditions.

Bacterial Infections

- Secondary bacterial infections of the skin, usually caused by group A streptococcus or *S. aureus*, may occur in children with varicella.
- These range from impetigo to cellulitis, lymphadenitis, and subcutaneous abscesses.
- An early manifestation of secondary bacterial infection is erythema of the base of a new vesicle.
- Varicella is a well-described risk factor for serious invasive infections caused by group A streptococcus, which can have a fatal outcome.

- The more invasive infections, such as varicella gangrenosa, bacterial sepsis, pneumonia, arthritis, osteomyelitis, cellulitis, and necrotizing fasciitis, account for much of the morbidity and mortality of varicella in otherwise healthy children.
- Bacterial toxin–mediated diseases (e.g., toxic shock syndrome) also may complicate varicella.


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Encephalitis

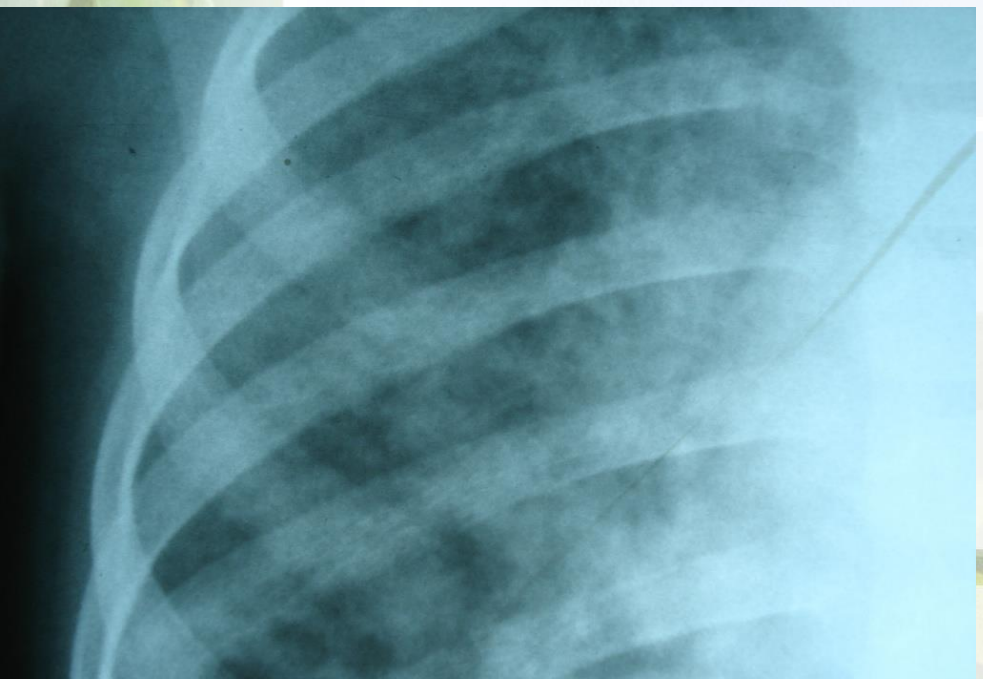
- Encephalitis (1 per 50,000 cases) and acute cerebellar ataxia (1 per 4,000 cases) are well-described neurologic complications of varicella
- Morbidity from central nervous system complications is highest among patients younger than 5 years and older than 20 years.
- Nuchal rigidity, altered consciousness, and seizures characterize meningoencephalitis.

Cerebellar Ataxia

- Patients with cerebellar ataxia have a gradual onset of gait disturbance, nystagmus, and slurred speech.
- Neurologic symptoms usually begin 2-6 days after the onset of the rash but may occur during the incubation period or after resolution of the rash.
- Clinical recovery is typically rapid, occurring within 24-72 hours, and is usually complete.
- Severe hemorrhagic encephalitis is very rare in children with varicella

Pneumonia

- Varicella pneumonia is a severe complication that accounts for most of the increased morbidity and mortality from varicella
- Respiratory symptoms, which may include cough, dyspnea, cyanosis, pleuritic chest pain, and hemoptysis, usually begin within 1-6 days after the onset of the rash.
- The frequency of varicella pneumonia may be greater in the parturient.

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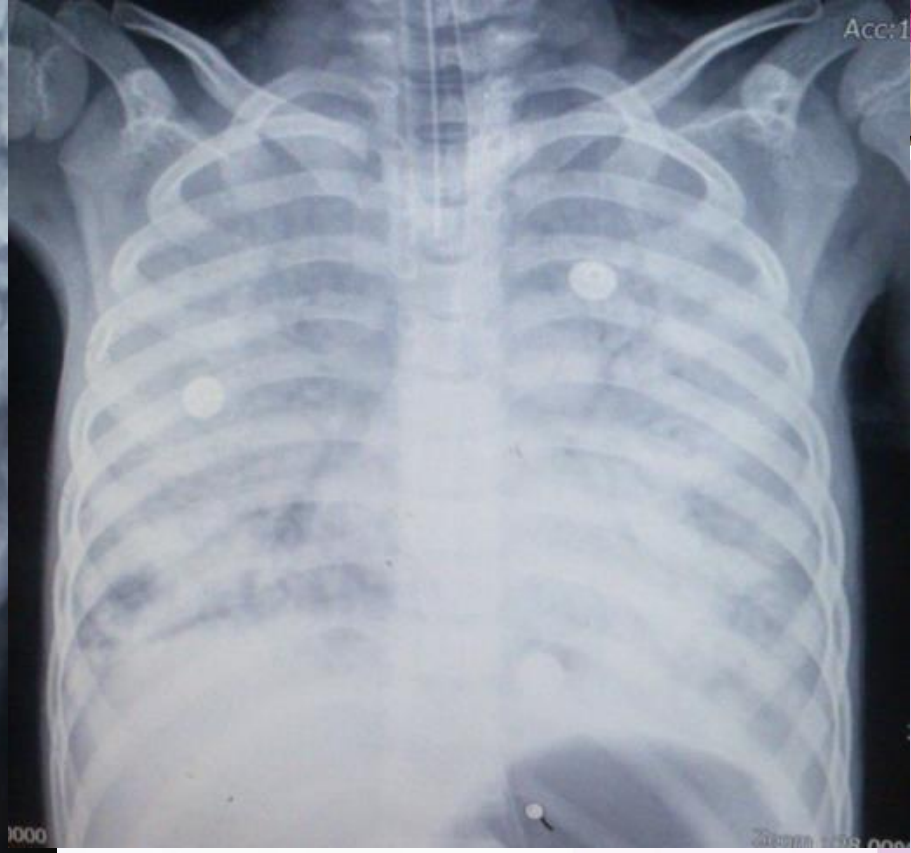
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و پنومونی با ویروس
آبله مرغان.

Progressive Varicella

- Progressive varicella, with visceral organ involvement, coagulopathy, severe hemorrhage, and continued vesicular lesion development after 7 days, is a severe complication of primary VZV infection.
- Severe abdominal pain, which may reflect involvement of mesenteric lymph nodes or the liver, or the appearance of hemorrhagic vesicles may herald severe, and potentially fatal disease.
- Although rare in healthy children, the risk for progressive varicella is highest in children with congenital cellular immune deficiency disorders and those with malignancy.


SCIENCE
OF MEDICAL

Immunization of HIV-infected children who have a CD4+ T-lymphocyte percent ≥15%, as well as children with leukemia and solid organ tumors who are in remission and whose chemotherapy can be interrupted for 2 weeks around the time of immunization or has been terminated, have reduced frequency of severe disease.

- Treatment of all children, adolescents, and adults with varicella is acceptable.
- Oral therapy with acyclovir (20 mg/kg/dose; maximum: 800 mg/dose) given as four doses/day for 5 days can be used to treat uncomplicated varicella.
- Therapy is particularly important for individuals at increased risk for moderate to severe varicella: individuals older than 12 years of age; individuals older than 12 months of age with chronic cutaneous or pulmonary disorders; individuals receiving short-term, intermittent, or aerosolized corticosteroid therapy; individuals receiving long-term salicylate therapy; and possibly secondary cases among household contacts.

- To be most effective, treatment should be initiated as early as possible, preferably within 24 hours of the onset of the exanthem.
- There is less clinical benefit if treatment is initiated more than 72 hours after onset of the exanthem.
- Acyclovir therapy does not interfere with the induction of VZV immunity.
- Acyclovir has been successfully used to treat varicella in pregnant women.

- Valacyclovir or famciclovir are better absorbed by the oral route than acyclovir.
- Valacyclovir (20 mg/ kg/dose; maximum: 1,000 mg/dose, administered 3 times daily for 5days
- Patients receiving these antivirals should be well hydrated
- Common adverse symptoms during valacyclovir treatment are neurologic (headache, agitation, dizziness) and gastrointestinal (nausea, abdominal pain).

- Intravenous therapy is indicated for severe disease and for varicella in immunocompromised patients (even if begun more than 72 hours after onset of rash).
- Any patient who has signs of disseminated VZV, including pneumonia, severe hepatitis, thrombocytopenia, or encephalitis, should receive immediate treatment. Intravenous acyclovir therapy (10 mg/kg or 500 mg/m2 every 8 hours) initiated within 72 hours of development of initial symptoms.
- Treatment is continued for 7-10 days or until no new lesions have appeared for 48 hours.
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PROGNOSIS

- Case fatality rates among children 1-9 years of age (~1 deaths/100,000 cases), infants have a 4 times greater risk of dying and adults have a 25 times greater risk of dying.
- The most common complications among people who died from varicella were pneumonia, central nervous system complications, secondary infections, and hemorrhagic conditions.
- Herpes zoster among healthy children has an excellent prognosis and is usually self-limited.
- Complications and sometimes fatalities can occur in immunocompromised children.

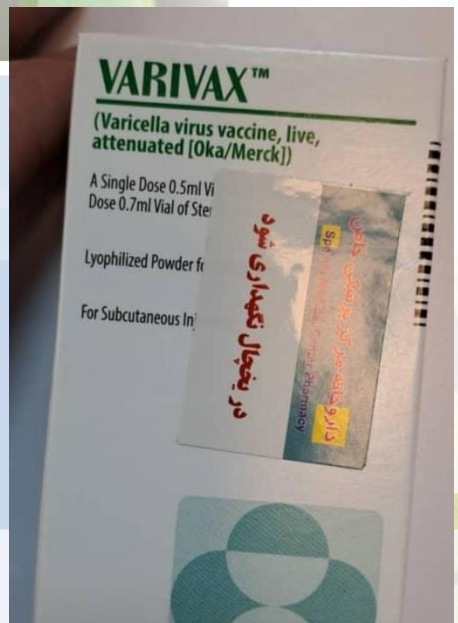
PREVENTION

- A person with varicella may be contagious for 24-48 hours before the rash is apparent.
- Herpes zoster is less infectious
- Infection control practices, including caring for patients with varicella in isolation rooms with filtered air systems, are essential.
- All healthcare workers should have evidence of varicella immunity
- Unvaccinated healthcare workers without other evidence of immunity who have had a close exposure to VZV should be furloughed for days 8-21 after exposure

Vaccine

- Varicella is a vaccine-preventable disease.
- Varicella vaccine contains live, attenuated VZV (Oka strain) and is indicated for subcutaneous or intramuscular administration.
- In the United States, varicella vaccine is recommended for routine administration as a two-dose regimen to healthy children at ages 12-15 months and 4-6 years.
- Administration of second dose earlier than 4-6 years of age is acceptable, but it must be at least 3 months after the first dose.

- The two-dose vaccine efficacy for preventing all disease at 98%; the estimate is 92% in conditions of everyday clinical practice.
- Implementation of the one dose varicella vaccination program in 1995 and two-dose program by 2006 was done in the United States.
- Declines reached more than 97% for incidence and 90% for hospitalizations and deaths.



- The minimum interval between the two doses is 3 months for persons 12 years of age or younger and 4 weeks for older children, adolescents, and adults.
- It is recommended that the varicella and MMR vaccines either be administered simultaneously at different sites or be given at least 4 weeks apart.
- Varicella vaccine can be administered as a monovalent vaccine or as the quadrivalent measles-mumps- rubella-varicella (MMRV) vaccine.

- Varicella vaccine is contraindicated for persons who have a history of anaphylactic reaction to any component of the vaccine; pregnant women; persons with cell-mediated immune deficiencies, including those with leukemia, lymphoma, and other malignant neoplasms affecting the bone marrow or lymphatic systems; persons receiving immunosuppressive therapy; and persons who have a family history of congenital or hereditary immunodeficiency in first-degree relatives unless the immune competence of the potential vaccine recipient is demonstrated.

- Children with isolated humoral immunodeficiencies may receive varicella vaccine.
- Varicella vaccine can be administered to patients with leukemia, lymphoma, or other malignancies whose disease is in remission, who have restored immunocompetence, and whose chemotherapy has been terminated for at least 3 months.

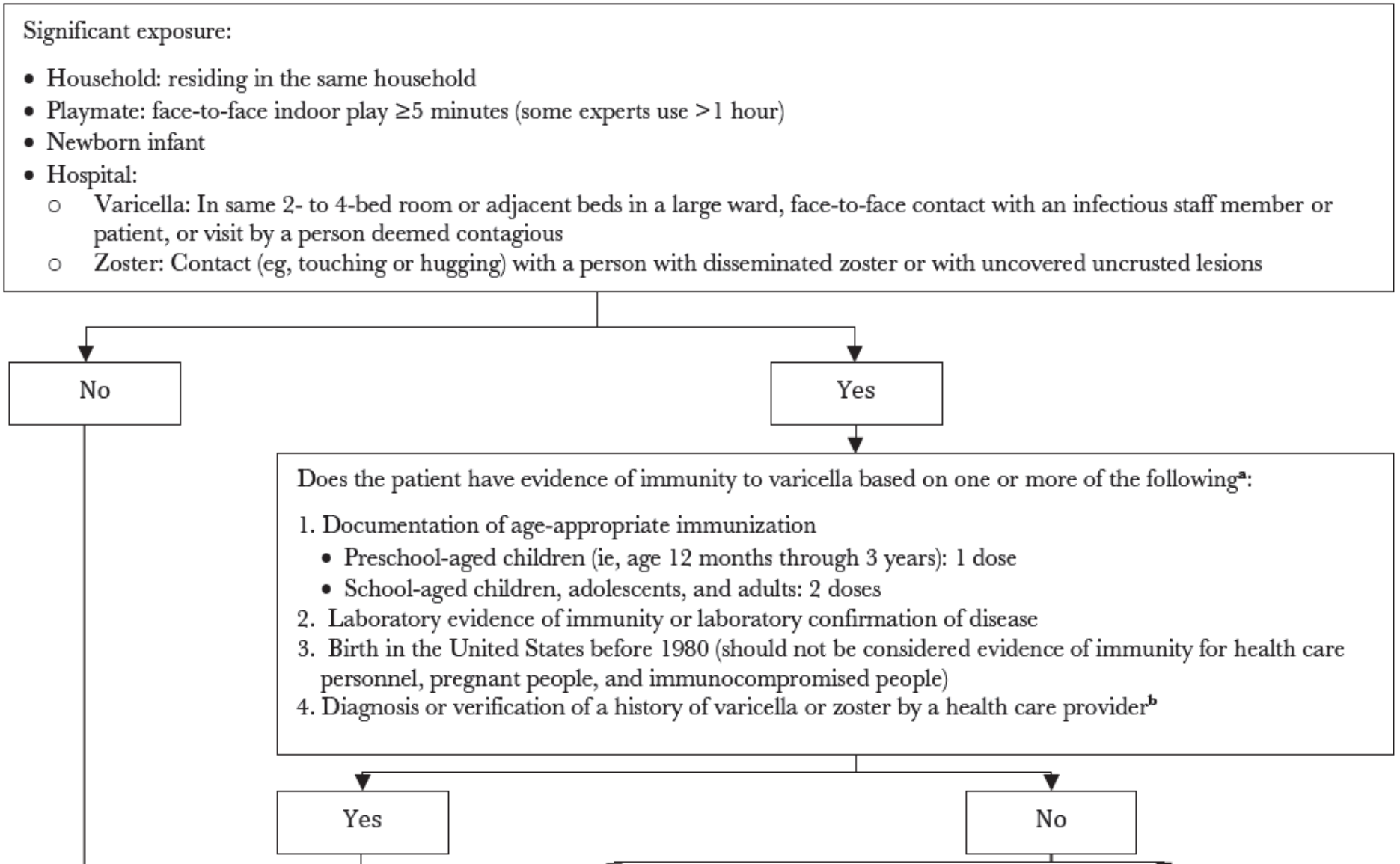
- The vaccine should be considered for HIV-infected children with a CD4+ T-lymphocyte count ≥200 cells/mm3 or percentage ≥15%.
- These children should receive two doses of the monovalent vaccine, 3 months apart.
- MMRV should not be administered as a substitute for the component vaccines in HIV-infected children.

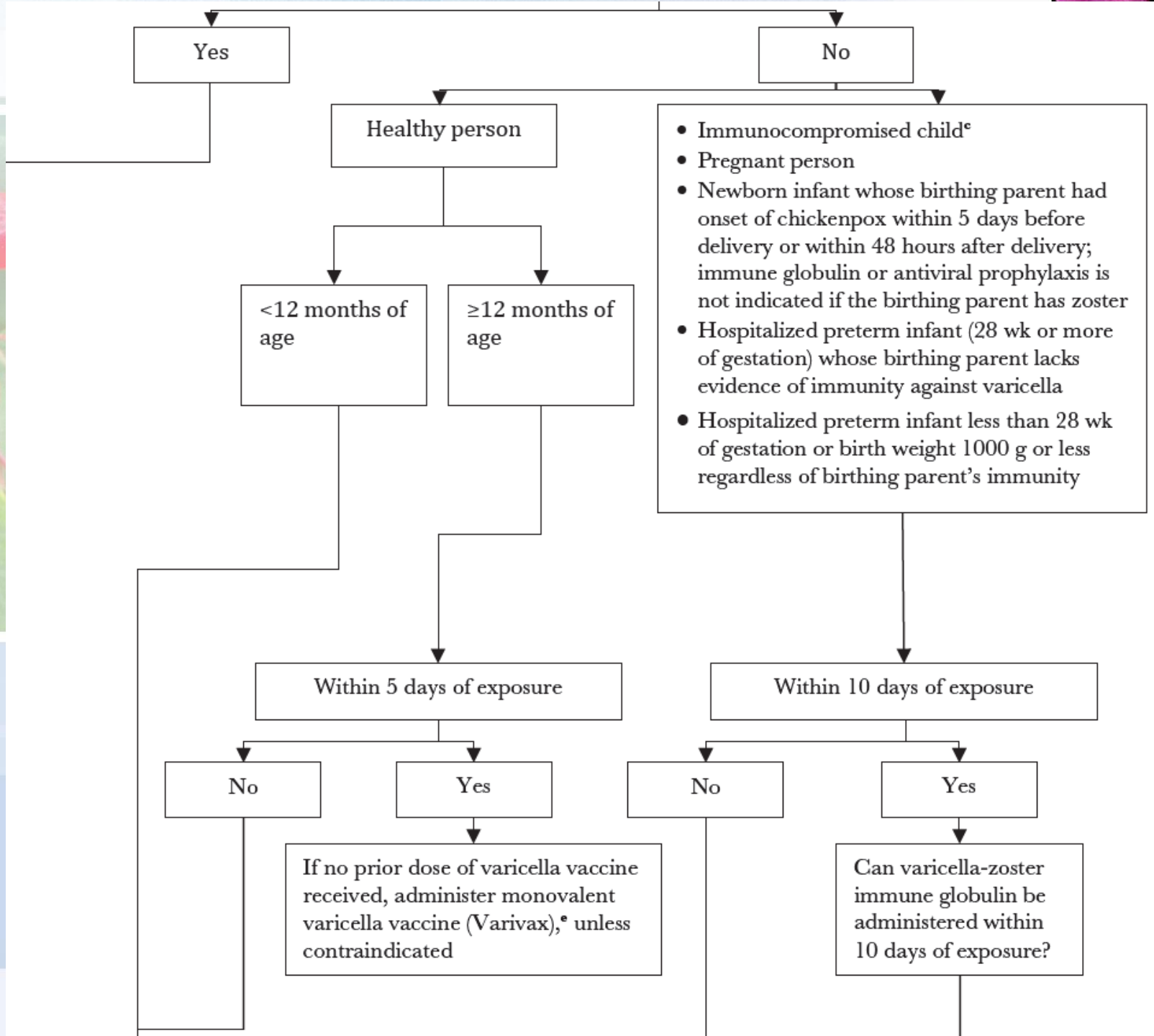
- Data indicate varicella vaccine is highly effective in preventing herpes zoster among children infected with HIV.

Vaccine-Associated Adverse Events

- Varicella vaccine is safe and well tolerated.
- The incidence of injection site complaints observed ≤3 days after vaccination was slightly higher after dose 2 (25%) than after dose 1 (22%).
- A mild vaccine-associated varicelliform rash was reported in approximately 1–5% of healthy vaccinees, consisting of 6-10 papular-vesicular, erythematous lesions with peak occurrence 8-21 days after vaccination.
- Serious adverse reactions confirmed to be caused by the vaccine strain are rare and include pneumonia, hepatitis, meningitis, recurrent herpes zoster, severe rash
- Transmission of vaccine virus to susceptible contacts is a very rare event.

Fig 3.22. Management of Exposures to Varicella-Zoster Virus




Yes
No
Healthy person
• Immunocompromised child[e]
• Pregnant person
• Newborn infant whose birthing parent had onset of chickenpox within 5 days before delivery or within 48 hours after delivery; immune globulin or antiviral prophylaxis is not indicated if the birthing parent has zoster
• Hospitalized preterm infant (28 wk or more of gestation) whose birthing parent lacks evidence of immunity against varicella
• Hospitalized preterm infant less than 28 wk of gestation or birth weight 1000 g or less regardless of birthing parent's immunity
<12 months of age
≥12 months of age
Within 5 days of exposure
Within 10 days of exposure
No
Yes
No
Yes
If no prior dose of varicella vaccine received, administer monovalent varicella vaccine (Varivax),[e] unless contraindicated
Can varicella-zoster immune globulin be administered within 10 days of exposure?

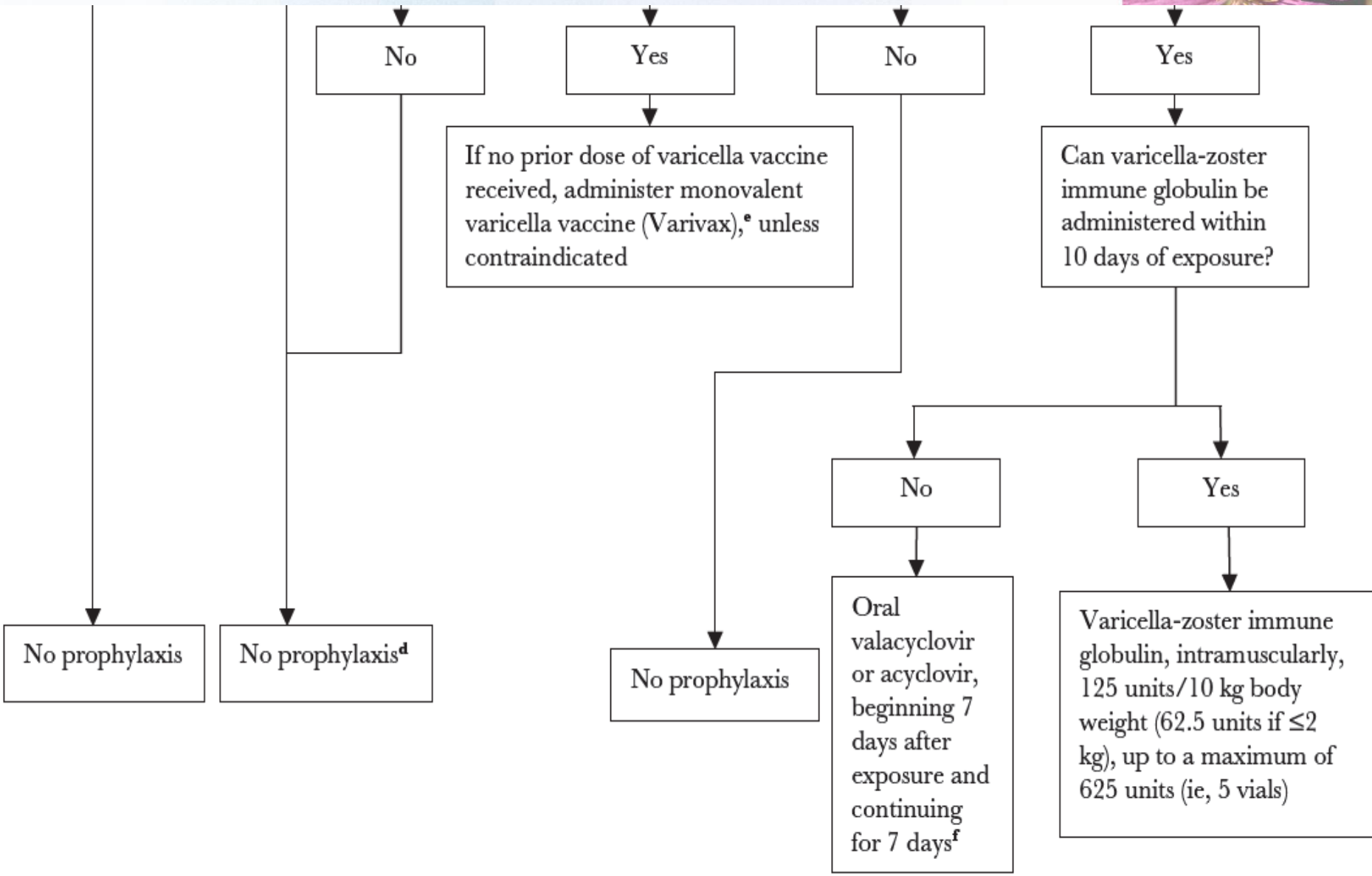

No
Yes
No
Yes
If no prior dose of varicella vaccine received, administer monovalent varicella vaccine (Varivax),[e] unless contraindicated
Can varicella-zoster immune globulin be administered within 10 days of exposure?
No prophylaxis
No prophylaxis[d]
No prophylaxis
No
Yes
Oral valacyclovir or acyclovir, beginning 7 days after exposure and continuing for 7 days[f]
Varicella-zoster immune globulin, intramuscularly, 125 units/10 kg body weight (62.5 units if ≤2 kg), up to a maximum of 625 units (ie, 5 vials)

Fig 3.22. Management of Exposures to Varicella-Zoster Virus, continued

IGIV indicates immune globulin intravenous.

[a] People who receive hematopoietic cell transplants should be considered nonimmune regardless of previous history of varicella disease or varicella vaccination in themselves or in their donors.

[b] To verify a history of varicella in an immunocompromised child, health care providers should inquire about an epidemiologic link to another typical varicella case or to a laboratory confirmed case, or evidence of laboratory confirmation. Immunocompromised children who have neither an epidemiologic link nor laboratory confirmation of varicella should not be considered as having a valid history of disease.

[c] Immunocompromised children include those with congenital or acquired T-lymphocyte immunodeficiency, including leukemia, lymphoma, and other malignant neoplasms affecting the bone marrow or lymphatic system; children receiving immunosuppressive therapy, including ≥2 mg/kg/day of systemic prednisone (or its equivalent) for ≥14 days, and certain biologic response modifiers; all children with human immunodeficiency virus (HIV) infection regardless of CD4+ T-lymphocyte percentage; and all hematopoietic cell transplant patients regardless of pretransplant immunity status.

[d] If the exposed person is an adolescent or adult, has chronic illness, or there are other compelling reasons to try to avert varicella, some experts recommend preemptive therapy with oral valacyclovir or acyclovir (see Chemoprophylaxis, below, for dosing). For exposed people ≥12 months of age, vaccination is recommended for protection against subsequent exposures.

[e] If 1 prior dose of varicella vaccine has been received, a second dose should be administered at ≥4 years of age. If the exposure occurred during an outbreak, a second dose is recommended for preschool-aged children younger than 4 years for outbreak control if at least 3 months have passed after the first dose.

[f] See Chemoprophylaxis, below, for dosing. If varicella-zoster immune globulin and either valacyclovir or acyclovir are not available, IGIV may be administered (400 mg/kg).